

EXPLANATION OF PLATE IX.

- Fig. 1.* *Difflugia urceolata*, Carter, engaged in division and shell-formation. The new shell composed of fragments of glass.
- Fig. 2.* The same, with half the shell removed. In the endoplasm besides sand-grains there are a number of red nuclei (here black).
- Figs. 3 a, b, c.* Shells of *Difflugia urceolata* divided in various directions indicated by the dotted lines.
- Fig. 4.* *Polystomella crispa*, Linn. The youngest chambers have been removed and a new calcareous wall has been formed over the lesion.
- Fig. 5.* The same, showing the regeneration on a large scale. *a*, from the side; *b*, from in front.
- Fig. 6.* The same, with six chambers partially removed, and with a common calcareous layer deposited over the cut surface.

XX.—*The Species of the Genus Urodacus contained in the Collection of the British (Natural-History) Museum.* By R. I. POCOCK, Assistant, Natural-History Museum.

[Plate VIII.]

THIS genus was described by Peters in 1861. It differs from other Scorpions, which are characterized by the possession of a pentagonal sternum and two lateral eyes, by the presence of a median keel upon the lower surface of each of the caudal segments.

Urodacus novæ-hollandiæ, the type of the genus and hitherto its sole representative, was described by Peters (Monatsber. d. k. Akad. Wissen. Berlin, 1861, p. 511) from specimens obtained from West Australia; and Count Keyserling, in his work 'Die Arachniden Australiens,' p. 34, has published a lengthy description of it, the description and accompanying figure (Pl. VIII. figs. 1, 1 *a*) being taken from specimens also from West Australia.

Whilst examining for identification the Scorpions contained in the collection of the British (Natural-History) Museum, I found that this genus *Urodacus* is represented by no less than four well-marked species. Three of these I believe to be new to science, and have consequently described; the fourth I refer to *U. novæ-hollandiæ* of Peters.

Of this last-named form the Museum possesses eleven specimens, a series which presents some interesting and, I believe, new facts connected with the sexual variation and the geographical distribution of the species.

Concerning the latter point, so far as I am aware, the occurrence of this form has hitherto never been reported from any place outside the Australian continent; and within the limits of this area no locality of smaller dimensions than West Australia has ever been assigned to a specimen of it.

It will therefore be of interest to state that in the National Collection there are in the first place four specimens from Ceylon; and in the second place, that of the Australian specimens, while two are ticketed merely W. Australia, three are from the Swan River and one from Port Lincoln.

With regard to the sexes of this species, I do not know that any difference between the two has ever been pointed out. At all events Count Keyserling makes no mention of the existence of any sexual features. But in the series of this species that I have examined two very distinct forms are to be noticed—the one possessing larger pectines and a longer tail, the other smaller pectines and a shorter tail; and, in the absence of any direct evidence of the fact, I judge from analogy that the specimens presenting the former characteristics are males and that those presenting the latter characteristics are females.

The two may with certainty be distinguished as follows:—

Male.—Cephalothorax as long as the first caudal segment + two thirds of the second; tail about four and three quarter times as long as cephalothorax; pectines projecting considerably beyond the distal margin of the coxal segment of the posterior pair of legs; pectinal teeth 19–22.

Female.—Cephalothorax as long as the first and the second caudal segments; tail about four times as long as cephalothorax; pectines not projecting so far as the distal margin of the coxal segment of the posterior pair of legs; pectinal teeth 12–14.

Count Keyserling's figure and description are without doubt taken from a small female specimen. The length of it is $54\frac{1}{2}$ millim., whereas the average length of the adult females that I have seen is about 70 millim.

Urodacus excellens, sp. n. (Pl. VIII. figs. 2, 2 a.)

Cephalothorax with a conspicuous circular incision in the middle of its anterior margin, marked throughout its length by a median sulcus, which behind dilates into an equilaterally triangular depression. The right and left portions of the

ocular tubercle continued in front as smooth ridges to rather more than one third of the distance between the central eyes and the hind margin of the anterior incision, and behind as smooth ridges to about half the distance between the central eyes and the anterior angle of the triangular depression; posterior two thirds of the cephalothorax laterally depressed, anterior third nearly horizontal; margins of the frontal lobes defined by a shallow impression. Cephalothorax quite smooth, neither granular nor rugose. Eyes slightly nearer the anterior than the posterior margin of the cephalothorax.

The six anterior *abdominal tergites* smooth, with granular posterior margins, each bearing anteriorly in the middle line a low wide crest, which behind divides into three portions, one median and one on each side; seventh abdominal tergite posteriorly and laterally granular, with two faintly defined dorsal keels.

Abdominal sternites perfectly smooth; the anterior half of each, the last excepted, marked with two sulci; the last marked in its posterior half with two smooth keels.

The four proximal *caudal segments* almost entirely smooth, the superior and supero-lateral keels alone being feebly granular; upper surface of fifth segment smooth, sulcate in front, flat behind; superior keel finely granular, supero-lateral keel more finely granular and abbreviated; infero-lateral keels evenly denticulate, converging in front; inferior median keel consisting of two posteriorly diverging series of denticles; space between the lower median and lateral keels smooth, with a granule here and there; vesicle ovate, somewhat coarsely granular beneath, smooth above and at the sides; faintly marked with longitudinal sulci, as in the following species; aculeus gently curved.

Chela.—Upper surface of *humerus* furnished with a few small, scattered granules, anterior and posterior borders granular; anterior surface furnished with two or three larger granules and with inferior border granular; inferior surface proximally slightly granular and rounded off into the posterior surface, which bears two larger granules near its distal end. The superior, posterior, and inferior surfaces of the *brachium* evenly rounded, neither keeled nor granular, posterior surface marked with two irregular series of pores, inferior surface marked posteriorly with a single series; superior and inferior margins of the anterior surface feebly granular.

Hand stout, rounded, and smooth, being feebly rugose on the inner (anterior) upper margin and exhibiting above and at the sides very faint indications of keels; a more conspicu-

ous keel on the under surface of the hand; on each side of this keel is a series of setiferous punctures.

Pectines not projecting so far as the distal margin of the posterior coxæ; number of teeth 17.

Colour piceous.

Measurements in millimetres.—Cephalothorax, length 17, width 16, as long as the first and second and one fourth of the third caudal segments; tail 63, *i. e.* about three and three quarter times as long as cephalothorax; length of fifth segment 15, width $4\frac{1}{2}$, height 4; length of vesicle and aculeus 14. Length of humerus 12, of brachium 14, of hand-back 14, of movable finger 19, width of hand $11\frac{1}{2}$, height $9\frac{1}{2}$; length of pecten 9, of pectinal tooth $1\frac{1}{4}$. Total length 116.

A single dried specimen (which, from the shortness of the pectines and of the tail, I believe to be a female) from Port Essington.

This is a well-marked species, conspicuous for the smoothness of its hands and cephalothorax and for its large size.

Urodacus armatus, sp. n. (Pl. VIII. figs. 3, 3 a.)

Cephalothorax with a shallow circular incision in the middle of its anterior margin; furnished throughout its length with a conspicuous median sulcus, which posteriorly dilates into an equilaterally triangular depression. The posterior portions of the right and left halves of the cleft ocular tubercle not terminating behind the eyes, but continuous with the margins of this triangular depression. The anterior third of the cephalothorax above horizontal, not granular, but slightly rugose; the posterior two thirds laterally depressed and granular. Immediately beneath the central eyes is a smooth, slightly depressed area. Eyes very slightly nearer the anterior than the posterior margin of the cephalothorax.

Abdominal tergites finely granular and marked with a low, median, longitudinal crest; on each side of the crest in the middle of the tergite is a faint impression, and in the anterior portion of the tergite an abbreviated sulcus. The granules, crest, and impressions are less conspicuous on the anterior than upon the posterior tergites. The posterior abdominal tergite furnished laterally with two granular keels.

Abdominal sternites perfectly smooth, the anterior half of each, the last excepted, being marked with two sulci, the last furnished in its posterior half with two smooth keels.

The four proximal *caudal segments* smooth; the keels conspicuous and smooth, with the exception of the superior and supero-lateral keels, which are slightly granular; the superior

keel posteriorly raised into a conspicuous sharp tooth; upper surface of fifth segment flat and smooth; superior keels granular, supero-lateral keel smooth and abbreviated, infero-lateral keels granular and converging in front, inferior median keel granular, space between the keels of the lower surface granular; vesicle finely granular beneath, smooth above, marked with five faint sulci—one median, two lateral, two inferior; aculeus gently curved.

Chela.—Upper surface of *humerus* bounded in front and behind by a row of denticles and bearing a few smaller tubercles; anterior surface bounded above and below by a row of denticles and furnished with two or three tubercles, inferior surface proximally granular, posterior surface smooth; the inferior surface not separated from the posterior by a row of tubercles. Anterior surface of *brachium* bounded above and below with a row of tubercles; for the rest the segment is smooth, furnished above, below, and behind with four faint keels; posterior portion of inferior surface bearing a row of setiferous punctures.

Hand strongly keeled, stout, faintly reticulated above, sparsely and feebly granular on its anterior (inner) surface, more strongly granular on its anterior-superior edge. Superior surface bearing a conspicuous keel and separated from the posterior (outer) surface by a strong keel, which is continued on to the immovable finger; posterior surface also medianly keeled and separated from the inferior surface by a strong keel, upon each side of which is a series of setiferous punctures; anterior surface bearing two granular keels, the inferior of which separates this surface from the lower surface.

Pectines long, projecting considerably beyond the distal margin of the coxæ of the posterior legs; number of teeth 21-22.

Colour ochraceous.

Measurements in millimetres.—Cephalothorax, length 10, width $9\frac{1}{2}$, as long as the first and three fourths of the second caudal segments; tail 45, *i. e.* four and a half times as long as cephalothorax; length of fifth segment 10, width 4, height 3; length of vesicle and aculeus $9\frac{1}{2}$; length of hand-back 7, width of hand 7, height $5\frac{1}{2}$, length of movable finger $8\frac{1}{2}$; length of pecten 8, of pectinal tooth $1\frac{1}{2}$. Total length about 74.

A single specimen (a male in the dried state) from Port Lincoln, Australia.

This species bears considerable resemblance to *U. novæ-hollandiæ*, Peters, but may at once be distinguished from it by the form of its superior caudal keels.

Urodacus abruptus, sp. n. (Pl. VIII. figs. 4, 4 a.)

Cephalothorax with a conspicuous incision in the middle of its anterior margin, marked throughout its length by a median sulcus, which near the hind margin terminates in a deep transverse depression, the sulcus and depression somewhat resembling respectively the handle and head of a hammer. The anterior and posterior terminations of the right and left portions of the ocular tubercle scarcely at all continuous behind and in front with the margins of this sulcus. Anterior third of cephalothorax above smooth and horizontal, posterior two thirds thickly granular and laterally depressed; margins of the frontal lobes defined by a very shallow sulcus; eyes a little further from the anterior than from the posterior margin.

Sides and posterior margins of the first six *abdominal tergites* granular, the rest smooth and shining; the anterior tergites more granular than the posterior; each of these tergites marked with four impressions, two anterior and crescentic, two posterior and straight; posterior tergite granular and furnished on each side with two short keels.

Sternites smooth and shining, marked with the usual abbreviated depressions; posterior tergite marked with four smooth keels, two near the middle line being very short.

Caudal keels well developed, the three inferior keels on the first three segments smooth, those of the fourth finely denticulate; the superior and supero-lateral keels of the first four segments denticulate, the posterior denticle of the superior keel being the largest; intercarinal spaces of these segments very finely granular; superior surface of the fifth segment distally flat; superior keels very finely denticulated, the three inferior keels strongly denticulate, the denticulations increasing in size from before backwards, lateral and inferior intercarinal spaces granular; vesicle below punctured, furnished beneath with two shallow sulci and on each side with one sulcus; aculeus slightly curved.

Superior surface of *humerus* sparsely and coarsely granular, bounded in front and behind by a row of denticles; anterior surface finely granular, with a few larger tubercles; posterior surface smooth, not separated from the inferior surface by a row of tubercles; inferior surface proximally granular. *Brachium* almost smooth, very finely granular above and with the upper and lower margins of the anterior surface very slightly roughened; inferior surface marked behind with a keel, upon the anterior side of which is a series of setiferous punctures.

Hand generally resembling in appearance that of *U. armatus* (cf. measurements).

Pectines projecting posteriorly as far as the distal margin of posterior coxæ; number of teeth 11–12.

Colour piceous, legs paler.

Measurements in millimetres.—Cephalothorax, length $6\frac{3}{4}$ width $7\frac{1}{2}$, as long as the first caudal segment + the second and one fourth of the third; length of tail $25\frac{1}{2}$, *i. e.* about three and two third times as long as cephalothorax; length of fifth caudal segment 6, width $2\frac{2}{3}$, height $2\frac{1}{2}$; length of vesicle and aculeus $5\frac{1}{2}$; length of humerus $4\frac{1}{2}$, of brachium $5\frac{1}{2}$, of hand-back $5\frac{1}{4}$, of movable finger 6; width of hand 5, height $4\frac{1}{4}$; length of pecten 4, of tooth $\frac{1}{2}$. Total length 47.

Of this species I have seen two dried females, one ticketed Adelaide, the other merely New Holland.

Synoptical Table of Species.

- a.* Hands smooth, with scarcely a trace of keels; cephalothorax laterally smooth, not granular *excellens*, sp. n.
- b.* Hands strongly keeled; cephalothorax laterally granular.
- a*¹. Right and left portions of ocular tubercle abruptly terminating behind the eyes; cephalothorax marked behind with a hammer-shaped depression *abruptus*, sp. n.
- b*¹. Right and left portions of ocular tubercle not abruptly terminating behind the eyes, but continuous with the margins of an equilaterally triangular depression.
- a*². Superior keels of the four proximal caudal segments in male produced behind into a large, sharp, upwardly directed tooth *armatus*, sp. n.
- b*². Superior keels of the four proximal caudal segments in male not produced into a large tooth *novæ-hollandiæ*, Peters.

EXPLANATION OF PLATE VIII.

Fig. 1. *Urodacus novæ-hollandiæ*, Peters, ♂. Nat. size.

Fig. 1 a. The same. Tail.

Fig. 2. *Urodacus excellens*, sp. n., ♀. Nat. size.

Fig. 2 a. The same. Sternum and pectines.

Fig. 3. *Urodacus armatus*, sp. n., ♂. Nat. size.

Fig. 3 a. The same. Tail.

Fig. 4. *Urodacus abruptus*, sp. n., ♀. Nat. size.

Fig. 4 a. The same. Cephalothorax, × 2.